IOT BASED SMART SECURITY GADGET FOR WOMEN'S SAFETY

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Abstract— **Nowadays, personal safety has become a significant problem for everyone, but especially for women. A recent survey made by WHO indicates 35 percent of women, globally, facing some form of abuse and physical violence. The count of victim is gradually increasing. Here we introduce a system which makes sure the women protection. The device can be easily carried and could be taken whenever they sense the danger. The project idea is to provide a swift responding and reporting safety device for women. The application helps women to overcome with fear and can call to her guardian that she can take the help. It reports a situation just by pressing button on the smart band. Our project resembles a smart band; it has the capability to protect the women, with the various sensors integrated within the band. When she wearing the band or a watch, if she face any Kind of harassment or if she feel something happened to be endanger she can press the button located on the watch, when she fall in down, the various information such as location, body posture, pulse rate and SMS alert are sent to the predefined number by using the GSM through Raspberry Pi. We can get the exact location of the victim by using the GPS it sends the longitude and latitude of the victim so that, police can easily find the victim and the incident can be easily avoided and can save the women, punish the culprit. Using the IoT platform one we can track the information of the women remotely. This will help to reduce the crime against the women**.

Keywords: GPS, GSM, IOT, Raspberry Pi.

I. INTRODUCTION

In global scenario the prime question in every girls mind is about her safety and harassment issue. Even though technology is growing fast in many areas, and several gadgets has been developed, but still girls and women facing problems. Crime against women such as, threats, sexual abuse, emotional abuse, control and & domineering, intimidation, stalking and economic deprivation, rape, abduction, kidnapping and murder .But despite the introduction of stricter laws, around 100 sexual assaults are reported to police in the country every day. Rape is the rapidly increasing crime in the India. Keeping all these in concern our project describes to build a solution security system. The device can be worn on a hand as a watch. It is completely a light-weighted band with a wide range of features and functionality. The basic approach is too intimate the instant location and to send an alert message and ring to the registered number like parents, friends, media and police etc. So that unfortunate incident would be avoided.

The band integrated with various sensors like pulse rate sensor, GPS (Global Positioning System), GSM (Global System for Mobile Communication), ADXL Motion Sensor, ADC, Alarm buzzer. All these sensors are connected to raspberry pi, which acts as a central controller. The band comprises with an emergency button, the woman can make use of this smart band by just pressing a button whenever she feels the situation is unsafe. When the button is pressed and if it meets the threshold values, alarm buzzer will be activated and it makes a loud sound to grab the attention of the people who are nearby from the victim, and an emergency alert message with the location will be generated and sent to the numbers along with the ring to the number which is already preprogrammed in GSM. This project also works automatically, when the ADXL motion sensor and pulse rate sensor meets the threshold values. All these sensors are programmed using python language. The idea is to design a device and to build a one stop solution security system based on IoT, for women, which is completely portable, also provides self-defense to help women escape in critical circumstances. One can also track the distressed women location remotely by using IoT platform.

II. RELATED WORKS

HasmahMansor in proposed a scheme for measuring Body Temperature using Remote Health Monitoring System [5].A device temperature sensor and the wireless sensor is used for measuring body temperature and heart rate. Humgnguyen is developed the systems called ambulatory [4] based on the inertial sensor to observe and detect the person's behavior in daily life with PD (Parkinson disease) and facilitate early treatment. It will identify the disease in short time. From the free environment, observe the disease and take treatment..

B.Vijayalakshmi [1] proposed a scheme to improve the women safety by using GPS and GSM model. A small device with a buzzer and microcontroller is designed, and it can be placed on band or watch. Rameshkumar.P in [2] described a scheme to identify the location of the individuals by using image metadata. A device GPS mapper is used to identify the location of a person using image and video by utilizing background metadata. Charranzhou in proposed a mechanism to find the trip ends [3] while travelling or not - travelling by using the smart phones based

on GPS tracking system. The author modeled a device using PR (Promoted Recall) technology and data-driven machine language to find the speed, distance, heading direction. Dawei fan in proposed a scheme to monitor, record, and analyze the person psychological, the behavior characteristics of a person and environmental change Dawei fan in [6] proposed a scheme to monitor, record, and analyze the person psychological, the behavior characteristics of a person and environmental change in indoor and outdoor actions. A Groups Are Detected Based on location, [11] P. N. Mahalle, B. Anggorojati, N. R. Prasad,A proposes a distributed, lightweight and attack resistant solution is the mandatory properties for the security solution in IoT. This paper presents an efficient and secure ECC based integrated authentication and access control protocol. This paper also presents a mutual authentication protocol and integrated with novel and secure approach of CAC for access control in IoT along with the implementation results. [8] Orlando Arias, Jacob Wurm , In this paper, The Internet of Things (IoT) , wearable devices, where embedded devices are loaded with sensors which collect information from surroundings. Then the information is processed and relayed to remote locations for analysis. Albeit looking harmless, these nascent technologies raise security and privacy concerns. They arise the question of the possibility and effects of compromising such devices.

They discuss common design practices and their implications on security and privacy concentrating on the design flow of IoT and wearable devices. [9] J. H. Ziegeldorf, O. G. Morchon proposed a scheme motivates four threats of privacy-violating interactions and presentations, lifecycle transitions, inventory attacks and information linkage arise later in the IoT evolution. The arrangement of threats in our reference model provides a clear idea of where threats appear and where to approach them conceptually. Finally, technical challenges are discussed in context of each threat that can provide clear directions for future research. [7] velocity and tracked the time using association algorithm. The behavior changes of people can be detected by using holistic approaches and video surveillance by representing in the 2D histogram. But it can't be able to detect the motions changes in human crowds in 3D histogram representation.

III. SYSTEM DESIGN

The device can be activated by just pressing the emergency button for the alert purpose. The method which works behind this is as explained below:

This smart device (based on IoT) shown in figure 1, which includes a GPS modem, is activated by retrieving its location based on its longitude and latitude, is fed to the raspberry pi 0, which retrieves the location details of the device from GSM and it triggers in the form of a text message. The wristband as shown in figure 2, along with the text message, also sends a signal which lead to a "miscall "to the predefined numbers via a chip embedded in the wearable device of the women and send the instant location of the device with a message "Save Me, I'm in Danger", through GSM.
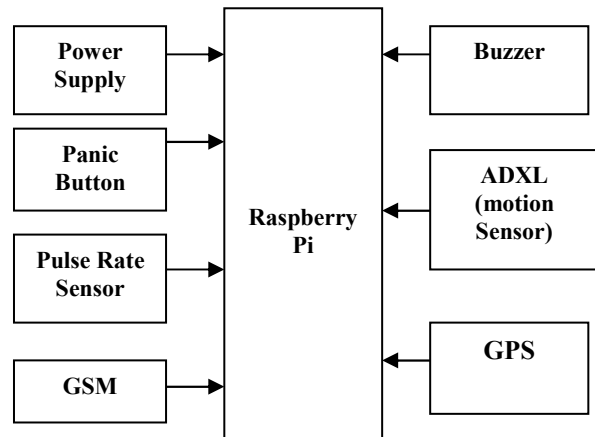

Fig 1.Block Diagram of Smart Gadget for Women's Safety

Fig 2.Women safety system model

A. The system integral components comprises

The model comprises the following components, which includes various sensors and devices as follow.

1. Raspberry Pi Zero

In our project we are using Raspberry pi zero is a small board as shown in figure 3, single core minicomputer. It acts as a central controller and it monitors all the sensors. It has high speed compare to other raspberry pi, it provides storage up to 1 Giga bytes.
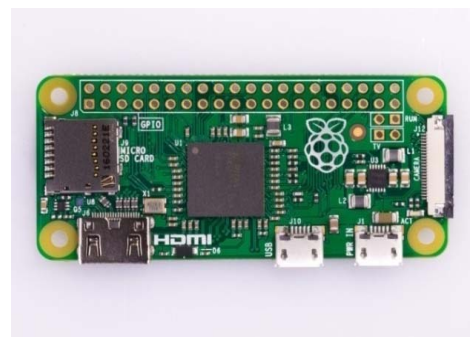

Fig 3.Raspberry pi zero

2. Pulse Rate Sensor

A pulse rate sensor is a small chip like sensor as shown in figure 4, usually the pulse beat of a normal human being is from 80 to 90 beats per minute. But it rises to 110 or 120

beats per minute in critical situations. It reacts for the above threshold level and sends the signal information. This sensor is monitored by Raspberry pi.
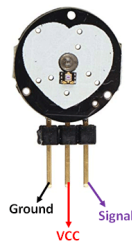

Fig 4.Pulse rate Sensor

3. GPS (Global Positioning System) sensor

GPS module in figure 5 is used to locate the exact location of the victim based on the longitude, latitude values of the sensors. GPS tracks the location of the victim it creates a location link that will be attached to the message, whenever any of the sensors resembles abnormal value.
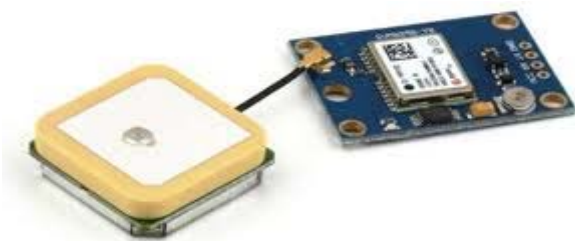

Fig 5.GPS Module

4. Accelerometer Sensor (ADXL)

The accelerometer sensor (ADXL) is used to obtain a body posture of the object. It is used to identify fall of the women. It is a device that measures proper acceleration of a body.

5. Analog to Digital Converter (ADC)

The Analog to Digital Converter is responsible for converting the analog signal to a digital form. It receives an analog signal as input and produces the digital signal as output as shown in figure 6. It is an 8 bit converter with 5V power supply.
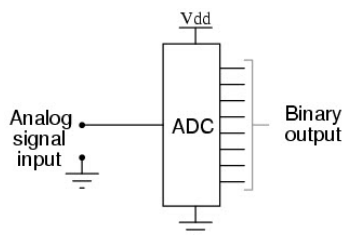

Fig 6.Block Diagram of ADC

6. Global System for Mobile Communication (GSM)

Global system for mobile communication is a device as shown in figure 7 to send the location obtained through GPS. The obtained values from the sensors are sent as an SMS to the few preprogrammed numbers. Global System for mobile communication is used for mobile communication that enables higher data transmission rate. GSM is a small chip like sensor consists of SIM card inserted into it. GSM transfers data serially based on AT commands.
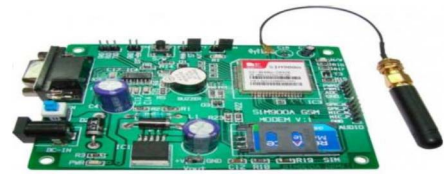

Fig 7.GSM Module

7. Switch

A band consist of a switch as shown in figure 8 is connected to raspberry pi GPIO pin, initially the switch value will be 1, when the button is pressed the value will be 0, this value is sent to raspberry pi, and then it respective measures.

Fig 8.Switch

When the button is pressed it sends the signal to the raspberry pi, and gets activated when the individual call for help.

7. Buzzer

The Alarm is designed to assist in alerting somebody in case Of emergency Situations.

8. Ubidots IoT platform

One can also track the live location of the victim using IoT platform, in order to connect the ubidots platform one should register by using mail id and password, GPS device MAC address which is present in the band is given to track the location of the victim.
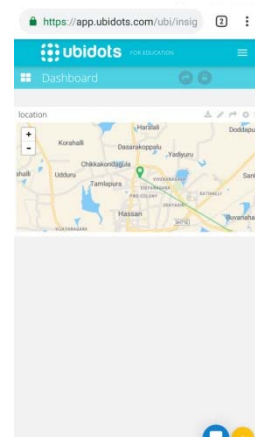

Fig 9.Sample location track

B. Software Algorithm

The project proposes the advanced automatic technique to recognize the unsafe situation based on the female emotion as fear, anger etc. The system follows the steps given below to determine the chaotic situation under the surveillance region to identify the violence situation.

Step 1: Initialize GPS sensor with 9600　　baud rate.

Step 2: Set the serial buffer with baud rate 9600 and bit rate 4800.

Step 3: When the button is pressed the readings are continuously sent to raspberry pi, Raspberry pi compare these values with the threshold values given to it.

Step 4: When the compared values meets the threshold values, it triggers the following actions.

Step 5: Scan the contact number from SIM.

Step 6: Receives data from GPS system.. Convert the longitude and latitude obtained from GPS into a Goggle URL. Attach this URL with an alert message. Send this message and ring to pre-programmed numbers in GSM.

C. Mathematical Model

The model consists of various functions as shown in figure 9 to determine various input and output to produce successful result.

Function womem_safety (S, T, B)

Inputs   :   *V determines the inputs*
                S obtains the victim values
                T gives the location to be tracked.
                B specifies the button click action

Outputs :   *O recognizes the outcome as*

                N given Notification

                L gives the Current location

                U gives the user details

IF B==1 || S==1 do   //button to pressed or threshold meets

F_1 (V) = S, T, B   //takes the value input

V = F = FS1 (), FT2 (), FB3 ()

F_2 (O) = N, L, U   //Produces the output
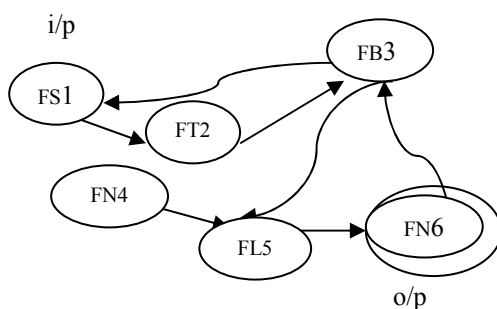
O= F = FN4 (), FL5 (), FN6 ()

Fig 9.Mathematical Model

D. Applications

Our project comprises the following applications,
- It can be used for women's safety.
- It can be used as a proof of the offence with exact data for punishment
- It can be used for child tracking during the abduction.
- It can also applicable for vehicle tracking system.
- It can be used for safety of euphemistic handicapped people.
- It can be used for the safety of old aged people.

E. Advantages

The gadget is user friendly and it has the following advantages,
- Women can go anywhere with more secure that it avoids the women rape.
- Culprits can be easily found and can be punished.
- The system is completely automated and requires no human interference and the device is comfortable and easy to wear and consumes less power.
- The device is affordable i.e., low in cost with great performance and provides very accurate data via GPS system it provide a quick response in critical situation by sending the remote location of asset from anywhere there is cellular Service.
- It is environmental friendly in nature.
- Facilitates simple asset recovery and tracking.

F. Validation

Developed model as shown in below figure 10 is a security gadget which works with DC power supply of 5V, sensors on device will start taking readings of heart beat sensor and ADXL motion sensor. These readings are continuously sent to raspberry pi. Raspberry pi will compare these readings of pulse rate sensor with the threshold value of 120 beats per minute, and ADXL value when the threshold angle of above 180 degree given to it. After comparing this threshold values, Raspberry Pi will send "Help" message accordingly. The help message along with ring will be sent even when the panic button is pressed. GPS is installed in device to continuously track the user. Using IoT platform ubidots one can also track the location of the victim, guardians can continuously monitor changes in sensors values. The above mentioned operations are successfully validated and getting the result successfully.
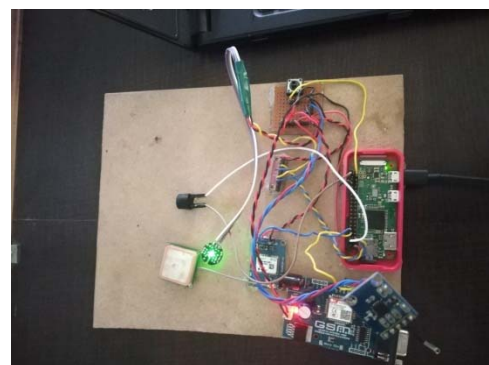

Fig 10.Proposed Model

IV.   EXPECTED RESULT

When the switch in the sensor kit is pressed, it generates a message as shown in figure11consists of location link , when the link is clicked it shows the current location of the victim in the google map as shown in figure 12, this message, will be sent to the preprogrammed number along with the ring. It will also send the message automatically when the value of the pulse rate and ADXL sensor meets the threshold value.
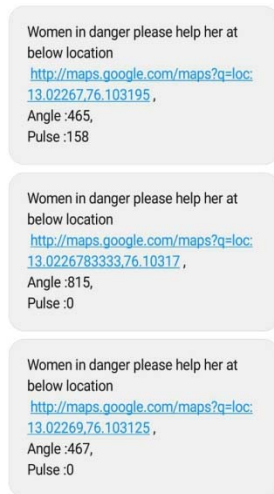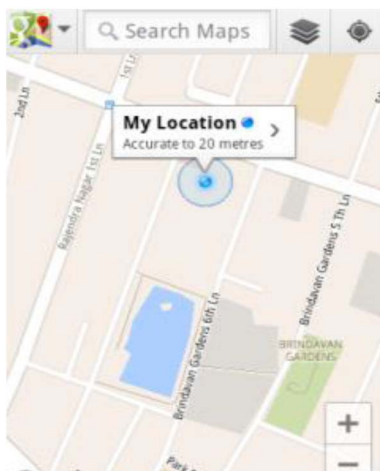

Fig 11.Sample SMS

Fig 12.GPS location on map

V.   CONCLUSION AND FUTURE ENHANCEMENT

This Project proposed the system for security of women .With the help of the wireless method which will communicate and alert the messages sent to the predefined number with the secure medium. When the button is pressed information of the user is collected by the sensors and then information will send to the predefined number along with calling. This system will helpful for speed up the monitoring for women safety by using the GPS tracking Mechanism. SMS will be sent to the preprogrammed numbers, and this will helps to save the time and victim gets help without any loss of time. The project is to ensure that security for the women by providing automatic sensing of problems, threats

and sends help messages and position of the victim to the relatives and nearby police station using Internet of Things.

In future enhancement this module can be implemented as, when the button in the band is pressed camera will automatically captures the images and it will collect the information of the user. The SMS will be sent to the default numbers along with the captured image link. This system monitoring safety of the women by using the GPS tracking system and sends the longitude and latitude of positions to the predefined numbers.

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